

REMARKS

Reconsideration of this application is requested. Claim 139 has been added. Although claims 1-139 are pending, claims 1-7, 9-32, 38-52, and 80-138 have been withdrawn from consideration. Therefore, claims 8, 33-37, 53-79, and 139 are at issue.

Rejection over Tang

Claims 8, 33-37, and 53-79 have been rejected under 35 U.S.C. §103(a) as obvious over Tang et al. (U.S. Patent No. 5,728,771). Tang teaches treating cellulose fibers with a mixture of a polyphosphinocarboxylic acid and an esterification catalyst to induce esterification and concurrent crosslinking. The esterification catalyst can be oxalic acid. The Examiner argues that it has not been shown that oxalic acid acts *only* as a crosslinking agent and never as a crosslinking catalyst. The Examiner further asserts “[n]owhere is there a teaching in the instant specification that oxalic acid remains on two different fibers after crosslinking has occurred” (see the first two lines on page 4 of the Office Action).

In the presently claimed cellulosic product, oxalic acid acts as a crosslinking agent. The term “crosslinking agent” as used in the art refers to an agent which becomes a bridge between two fibers or two locations on the same fiber, not an agent which facilitates crosslinking or catalyzes crosslinking reactions. See, for example, Cellulose and Cellulose Derivatives, Tersoro and Willard, Bikales and Segal, eds., Part V, Wiley-InterScience, New York, 1971, page 851; Zhou et al., *J. Appl. Polymer Sci.* 58:1523-1534 (1995) (the figure on page 1524 in particular); Caulfield, *Tappi Journal* 77(3):205-212 (the figure on page 206 in particular); Campbell et al., *Textile Research Journal*, March 1965, pages 260-270 (page 261 in particular). The oxalic acid crosslinking agent, therefore, remains in the crosslinked product.

Tang does not disclose or suggest cellulose fibers crosslinked with oxalic acid as recited in the presently claimed invention. Rather in Tang, oxalic acid is used as a catalyst, that is, a substance that modifies and increases the rate of a reaction *without being consumed in the process*. Therefore, the oxalic acid in Tang's process is not part of the crosslinked product.

Regarding claim 8 of this application, which is dependent upon withdrawn claim 1, it is not possible to consider the merits of the rejection as applied to claim 8 without considering the base claim from which claim 8 depends. The base claim recites a cellulose fiber having a median desorption pressure, as determined in a capillary absorption-desorption cycle, of 15 cm or less. Claim 8 specifies that the fiber is crosslinked. The Examiner asserts that it would have been obvious to use oxalic acid as a crosslinking agent and that the product produced would have the desorption pressure recited by the claim based on the cited reference Tang. Tang teaches the presence of at least 10 mole percent polyphosphinocarboxylic acid and from 4 to 12 weight percent of an esterification catalyst that catalyzes the esterification of the cellulose with the polyphosphinocarboxylic acid. Tang mentions oxalic acid as an esterification catalyst. There is no suggestion in Tang that crosslinking can occur without the recited crosslinking agent, polyphosphinocarboxylic acid. Further, there is no motivation provided by Tang for the use of oxalic acid, or any of the other crosslinking agents claimed in this patent application, as crosslinking agents, rather than as catalysts for some other essential crosslinking agent. The Examiner's assertion is unsupported by the reference, and does not constitute a *prima facie* argument for obviousness. The reference in no way makes obvious claim 8 of this application. Reversal of the rejection is requested.

Claim 33 recites cellulose fibers crosslinked with at least one crosslinking agent selected from saturated dicarboxylic acids, aromatic dicarboxylic acids, cycloalkyl dicarboxylic

acids, bifunctional monocarboxylic acids, and amine carboxylic acids and having a median desorption pressure as measured in a capillary absorption-desorption cycle of 25 cm or less. The recited crosslinking agents are not mentioned as crosslinking agents in Tang. Tang also provides no motivation to even consider that the recited classes of compounds would be useful as crosslinking agents for cellulose fibers. Recitation in Tang of oxalic acid as a catalyst for the essential crosslinking agent of Tang provides absolutely no indication or suggestion that oxalic acid in and of itself could be a crosslinking agent. It certainly does not suggest the crosslinking agents of claim 33, or as further delimited by the dependent claims 34-79. Again, the assertion of obviousness is not supported by the reference. Reversal of the rejection is requested.

The Examiner asserts that the applicant uses esterification to mean crosslinking and cites page 4, line 22, of this application. At page 4, line 22, there is a discussion of a cited reference which teaches “. . . that esterification (or crosslinking) did not take place with oxalic acid.” The applicants readily admit that the prior art teaches away from the instant invention.

Various dependent claims of this application are directed to a crosslinking facilitator, claims 54-59, for example. The specification of this application on page 19, lines 1-7 has this discussion of crosslinking facilitators:

The crosslinking facilitators of the present invention increase the efficacy of the crosslinking agents. A preferred crosslinking facilitator is oxalic acid. Without being bound by any theory, it is believed that oxalic acid ($pK_a = 1.23$) may serve as an acid catalyst for esterification of the crosslinking agent. Alternatively, oxalic acid may form a mixed anhydride with the crosslinking agent which then facilitates esterification of the cellulose fibers

It is clear from this discussion that oxalic acid is a preferred crosslinking facilitator for esterification of the crosslinking agent. It is also clear that it functions in this role

in the presence of another crosslinking agent of this invention. It may serve as a catalyst. However, the applicants have not described it as a catalyst, which it may be in the presence of a crosslinking agent, because its exact role in facilitating crosslinking is not known, and, since, by itself, it can act as a crosslinking agent. Behavior as a crosslinking agent is previously unknown, and, in fact, is contrary to the teachings of the prior art. SEE H. J. Campbell and T. Francis, *Textile Res. J.*, 35:260 (1965).

The assertion of the Office that “[c]rosslinking agents can also behave as crosslinking catalysts” (June 24, 2003 Office Action, page 3, last paragraph), is thus revealed as a teaching of the instant application. It is not found in the reference cited in the rejection. The impermissible use of hindsight and the teachings of the instant application cannot provide the motivation required to make a *prima facie* argument for obviousness. Reversal and passage of the claims to allowance is requested.

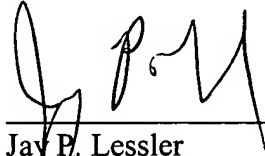
February 14, 2002 Information Disclosure Statement

Applicants have not received an initialed copy of the Form PTO 1449 submitted with the Supplemental Information Disclosure Statement filed on February 14, 2002. A copy of the Form PTO-1449 filed on February 14, 2002 is enclosed. In accordance with MPEP Sections 609 and 707.05(b), it is requested that each reference listed on the Form PTO-1449 be given thorough consideration and that it be cited of record in the prosecution history of the present application by initialing on the Form PTO-1449.

In view of the above remarks, it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

Respectfully submitted



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